

Possible Health Effects of Radiation Exposure on Unborn Babies

With recent discussion about the possibility of a terrorist attack involving radioactive materials, some people may be concerned about radiation exposure to unborn babies. The Centers for Disease Control and Prevention (CDC) has prepared this fact sheet to help you understand the possible health effects to your unborn baby from exposure to radiation.

Prenatal Radiation Exposure

The exposure of an unborn baby to radiation is referred to as prenatal radiation exposure. This can occur when the mother's abdomen is exposed to radiation from outside her body. Also, a pregnant woman who accidentally swallows or breathes in radioactive materials may absorb that substance into her bloodstream. From the mother's blood, radioactive materials may pass through the umbilical cord to the baby or concentrate in areas of the mother's body near the womb (such as the urinary bladder) and expose the unborn baby to radiation.

The possibility of severe health effects depends on the gestational age of the unborn baby at the time of exposure and the amount of radiation it is exposed to. Unborn babies are less sensitive during some stages of pregnancy than others. However, unborn babies are particularly sensitive to radiation during their early development, between weeks 2 and 15 of pregnancy. The health consequences can be severe, even at radiation doses too low to make the mother sick. Such consequences can include stunted growth, deformities, abnormal brain function, or cancer that may develop sometime later in life. However, since the baby is shielded by the mother's abdomen, it is protected in the womb from radioactive sources outside the mother's body.

Consequently, the radiation dose to the unborn baby is lower than the dose to the mother for most radiation exposure events.

Pregnant women should consult with their physicians if they have any concern about radiation exposure to their unborn baby.

Increased Cancer Risk

- **Radiation exposure before birth can increase a person's risk of getting cancer later in life.**
- Unborn babies are especially sensitive to the cancer-causing effects of radiation. However, the increased risks depend on the amount of radiation to which the baby was exposed and the amount of time that it was exposed. For example, if the radiation dose to the unborn baby was roughly equivalent to 500 chest x-rays at one time, the increase in lifetime cancer risk would be less than 2% (above the normal lifetime cancer risk of 40 to 50%).

Other Risks from Radiation Exposure

- Health effects other than cancer from radiation exposure are not likely when the dose to the unborn baby is very low.

- Most researchers agree that babies who receive a small dose of radiation (equal to 500 chest x-rays or less) at any time during pregnancy do not have an increased risk for birth defects. The only increased risk to these babies is a slightly higher chance of having cancer later in life (less than 2% higher than the normal expected cancer risk of 40 to 50%).
- **During the first 2 weeks of pregnancy, the radiation-related health effect of greatest concern is the death of the baby.**
- The unborn baby is made up of only a few cells during the first 2 weeks of pregnancy. Damage to one cell can cause the death of the embryo before the mother even knows that she is pregnant. Of the babies that survive, however, few will have birth defects related to the exposure, regardless of how much radiation they were exposed to.
- **Large radiation doses to the unborn baby during the more sensitive stages of development (between weeks 2 and 15 of pregnancy) can cause birth defects, especially to the brain.**
- When an unborn baby is exposed to large doses of radiation (above the dose received from 500 chest x-rays) during the more sensitive stages of development (especially between weeks 8 and 15 of pregnancy), the health consequences can be severe, especially to the brain. Babies exposed to the atomic bombs dropped on Hiroshima and Nagasaki during the 8- to 15-week stage of pregnancy were found to have a high rate of brain damage that resulted in lower IQs and even severe mental retardation. They also suffered stunted growth (up to 4% shorter than average people) and an increased risk of other birth defects.
- **Between the 16th week of pregnancy and birth, radiation-induced health effects (besides cancer) are unlikely unless the unborn baby receives an extremely large dose of radiation.**
- In the 16- to 25-week stage of pregnancy, health consequences similar to those seen in the 8- to 15-week stage could occur, but only when the doses are extremely large (more than about 5,000 chest x-rays received at one time). At this dose level, the mother could be showing signs of acute radiation syndrome (see www.bt.cdc.gov/radiation/ars.asp), which is sometimes known as radiation sickness.
- **After the 26th week of pregnancy, the radiation sensitivity of the unborn baby is similar to that of a newborn.**
- At the 26th week of pregnancy, the unborn baby is fully developed though not fully grown. Unborn babies exposed to radiation in the womb during this stage of pregnancy are no more sensitive to the effects of radiation than are newborns. This means that birth defects are not likely to occur, and only a slight increase in the risk of having cancer later in life is expected.

AGAIN, IT IS IMPORTANT FOR WOMEN WHO ARE CONCERNED ABOUT RADIATION EXPOSURE TO THEIR UNBORN BABIES TO CONSULT THEIR PHYSICIAN. TO REQUEST MORE INFORMATION, YOU MAY CALL THE CDC PUBLIC RESPONSE LINE AT 1-800-311-3435 OR VISIT THE WEB SITE AT www.cdc.gov/netinfo.htm.

For additional information, visit www.health.pa.gov or www.emergency.cdc.gov.